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output data indicative of a lattice characteristic of the specimen being tested.

Please cancel claim 29 without prejudice to the subject matter contained therein.

REMARKS

Claims 20 and 26 are amended. Claims 25 and 29 are canceled. Re-examination and reconsideration are requested.

To facilitate entry of the amendments, please find attached hereto a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "Version with markings to show changes made."

In the final office action, paper no. 9, dated January 22, 2003, for the parent application, the examiner objected to the specification under 35 U.S.C. §112, first paragraph, as failing to provide an adequate written description of the invention and as failing to adequately teach how to make and/or use the invention.

The examiner rejected claims 1-3, 5, 7, 8, and 20-36 under 35 U.S.C. §112, first paragraph for the reasons stated with respect to the disclosure. The examiner rejected claims 1-3, 5, 7, 8, and 20-36 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter of the invention.

The examiner rejected claims 1-3, 7, and 8 under 35 U.S.C. § 102(b) as being anticipated by Pongratz *et al.*, U.S. Patent No. 5,175,756 ("Pongratz"). The examiner rejected claims 1-3 and 8 under Section 102(b) as being anticipated by Miller, U.S. Patent No. 4,980,901 ("Miller"). The examiner rejected claim 5 under 35 U.S.C. §103(a) as being unpatentable over Miller in view of Alex *et al*, U.S. Patent No. 4,064,438 ("Alex"), as set forth in Section 7 of the office action. The examiner rejected claims 20, 21, 23, 24, 26-28, and 31-36 under Section 103(a) as being

obvious over Pongratz or Miller and in "view of applicant's own admission of prior art in the specification," as set forth in Section 8 of the office action.

Applicant believes that none of the pending claims are anticipated by or obvious over the cited references and respectfully traverses the examiner's rejections for the reasons that will be set forth below.

Re the Title:

The Title is amended to make it consistent with the claims. No new matter is introduced.

Re the Abstract:

The Abstract is amended to make it consistent with the pending claims. No new matter is introduced.

Re the Specification:

The "Summary of the Invention" section of the specification is amended to make it consistent with the pending claims. No new matter is introduced.

Re the Claims:

Claim 20 is amended to include limitations previously contained in claim 25 (canceled by this amendment). No new matter is introduced.

Claim 26 is amended to include limitations previously contained in claim 29 (canceled by this amendment). No new matter is introduced.

Re the Section 112, First Paragraph Rejections:

Claims 1-3, 5, 7, 8, and 20-36 currently stand rejected under Section 112 as based on an insufficient disclosure. The disclosure is also objected to as failing to provide a description of the invention that is sufficient to allow a person having ordinary skill in the art to practice the invention

without undue experimentation. However, because the basis for rejecting the claims is the same as the basis for objecting to the specification (i.e., a non-enabling disclosure), the rejections of the claims will be addressed first, since a resolution of that issue will be dispositive of the objections to the specification. See, for example, Ex parte C, 27 USPQ2d 1492, 1494 (BdPatApp&Int, 1992):

> "When the specification is 'objected to' and the claims are 'rejected' for the same reasons, consideration of the propriety of the objection is usually held in abeyance because the Board's decision may well be dispositive of both the 'objection' and the 'rejection.'"

Legal Standard For Rejecting Claims Under 35 U.S.C. §112, First Paragraph

The legal standard for determining whether the disclosure provides a sufficient description of the invention is whether a person reasonably skilled in the art could make or use the invention without undue experimentation based on the disclosure and on information known in the art. United States v. Telectronics, Inc., 857 F.2d 778, 8 USPQ2d 1217 (Fed. Cir. 1988). The fact that experimentation may be complex does not necessarily make it undue if the art typically engages in such experimentation. In re Wands, 858 F.2d 731, 8 USPQ2d 1400 (Fed. Cir. 1988). That is, the test of enablement is not whether any experimentation is required, but whether, if experimentation is necessary, it is undue. In re Angstadt, 537 F.2d 498, 190 USPQ 214 (CCPA 1976).

The factors to be considered when determining whether there is sufficient evidence to support a determination that a disclosure does not satisfy the enablement requirement and whether any necessary experimentation is "undue" include, but are not limited to: The breadth of the claims; the nature of the

invention; the state of the prior art; the level of one of ordinary skill; the level of predictability in the art; the amount of direction provided by the inventor; the existence of working examples; and the quantity of experimentation needed to make or use the invention based on the content of the disclosure. See, for example, MPEP 2164.01(a). It is improper to conclude that a disclosure is not enabling based on an analysis of only one of the above factors while ignoring one or more of the others. MPEP 2164.01(a).

With regard to the burden of proof required to support a rejection under Section 112, the Patent Office is required to assume that the specification complies with the enablement provision of Section 112 unless it has acceptable evidence or reasoning to suggest otherwise. See, for example, In re Marzocchi, 439 F.2d 220, 169 USPQ 367 (CCPA 1979). The Patent Office thus must provide reasons, supported by the record as a whole, why the specification is not enabling. Then and only then does the burden shift to the applicant to show that one of ordinary skill in the art could have practiced the claimed invention without undue experimentation. Gould v. Missinghoff, 229 USPQ 1 (D.D.C. 1985), aff'd in part, vacated in part, and remanded sub. nom., Gould v. Quigg, 822 F.2d 1074, 3 USPQ2d 1302 (Fed. Cir. 1987). Mere conclusionary statements as to the level of ordinary skill in the art are not a sufficient basis for a rejection under 35 U.S.C. §112. In re Brebner, 455 F.2d 1402, 173 USPQ 169 (CCPA 1972).

In addition, the law does not require, and indeed prefers, that a patent specification omit that which is well-known. In re Buchner, 929 F.2d 660, 18 USPQ2d 1331 (Fed. Cir. 1991).

The Examiner's Rejections

The examiner rejected claims 1-3, 5, 7, 8, and 20-36 under 35 U.S.C. §112, first paragraph, as containing subject matter that is not sufficiently described by the specification. The examiner's rejections are improper in that the Patent Office has

failed to meet is burden of proof as to why the disclosure is insufficient.

The examiner's objections to the specification and rejections of the claims are based on erroneous remarks about what the specification fails to teach. The objections and rejections also appear to be based on a failure to review the entire specification. For convenience, the remarks presented by the examiner are addressed herein in the order presented in section 2 of the office action.

Remark 1:

By reference to page 8 of the specification, the examiner contends that the specification is insufficient as to what exactly is meant by the term "activation/analysis" as it appears in the names of the various processes set forth in the application and claims. While the examiner correctly states that these processes are presented in Figures 3 and 4 with no description of the internals thereof, the examiner makes no mention of the detailed descriptions of these processes that are provided in the specification at places other than page 8. For example, the normal activation/analysis process 38 is discussed in paragraphs 0049-0050 on pages 24 and 25. The rapid activation/analysis process 40 is discussed in paragraphs 0051-0054 on pages 25-27.

Specifically, paragraphs 0049-0050, which describe the normal activation/analysis process 38, are as follows:

> "The normal activation/analysis process 38 is best seen in Figure 3. The first step 42 in the normal activation/analysis process 38 involves activating the positron emitter (i.e., the isotope or isotopes identified in step 32). In one preferred embodiment, the positron emitter is activated by bombarding the specimen 18 with photons 16 from the photon source 12 having energies sufficient to activate the selected positron emitter or emitters, as the case may be. As mentioned above, photons having energies in the range of about 8 MeV to about 22 MeV

will activate most of the isotopes (i.e., positron emitters) likely to be found in many common materials. See, for example, Tables I and II. Alternatively, of course, photons having energies either above or below this range may be used, depending on the particular isotope and on the particular material characteristics to be detected. In the example involving chromium-49, the photons 16 produced by the photon source 12 should have energies of at least 20.5 MeV.

The photon-activated positron emitters result in the production of positrons within the specimen 18. Such positrons diffuse or migrate through the material comprising specimen 18 and tend to be attracted to voids or other lattice defects having a favorable electronic potential. Ultimately, a significant number of the positrons produced by the positron emitter or emitters will annihilate with electrons, resulting in the formation of gamma rays 20. Such gamma rays 20 are detected in step 44 by the detector 14, which produces raw data 22. The raw data 22 are then analyzed in step 46 to produce output data 26 indicative of at least one material characteristic of the specimen 18. The output data 26 may be displayed in suitable form on the display system 28. See Figure 1."

Clearly, the normal activation/analysis process 38 is sufficiently described in the specification, especially when considered in light of the factors listed in MPEP 2164.01(a) identified above. That is, the nature of the invention, the state of the prior art, and the level of one of ordinary skill in the art are such that the description provided in the specification is more than sufficient to all a person having ordinary skill in the art to practice the invention without undue experimentation. The state of the prior art in this field is well-developed, as evidenced by the prior art of record in this application. The level of one of ordinary skill in the art is also high, and certainly does not require a detailed, line-by-line recitation of computer code that may be required to perform the normal activation/analysis process 38. Stated another way, while some experimentation might be required to settle upon an optimum arrangement for a particular application, such

experimentation is allowable in that it would not be "undue."

In addition, and to address the specific concern of the examiner, the description also clearly explains that the normal activation/analysis process 38 involves both the activation of the positron emitters as well as an analysis of the raw data 22 collected by the detector.

Turning now to the rapid activation/analysis process 40, paragraphs 0051-0054 of the present application describe the rapid activation/analysis process 40 as follows:

> "If the half life of the isotope or positron emitter to be activated is less than a few tens of seconds, as determined in step 36, the method 30 executes the rapid activation/analysis process 40. With reference now to Figure 4, the rapid activation/analysis process 40 involves alternate photon bombardment and subsequent gamma ray detection of the specimen 18. More specifically, the specimen 18 is first exposed to the photons 16 from the photon source 12 for a selected time at step 48. Then, gamma rays 20 resulting from the annihilation of positrons with electrons are detected via detector 14 at step 50. If a sufficient number of gamma rays 20 have been detected, as determined in step 53, the method 30 proceeds to step 54 wherein the data are analyzed to produce output data 26 (Figure 1) that are indicative of at least one material characteristic of the specimen 18. The output data 26 may be displayed in suitable form on the display system 28. Alternatively, if an adequate number of gamma rays 20 have not been detected, the method 30 returns to step 48 wherein the specimen 18 is again exposed to photons 16 from the photon source 12 for a selected time. This rapid activation/analysis process 40 is repeated until a sufficient number of gamma rays 20 have been detected.
>
> The alternate photon activation and detection steps 48 and 50, respectively, may be accomplished in a variety of ways. For example, with reference now to Figure 5, the specimen 18 could be alternately moved between an activation position 56 and a detection position 58. A suitable mechanical arrangement (not shown) may be provided to move the specimen 18 between the activation position 56 and the detection position 58. Alternatively, of course, the specimen 18 could remain stationary while the photon source 12 and

detector 14 are moved. Again, a suitable arrangement for so moving the photon source 12 and detector 14 could be easily arrived at by persons having ordinary skill in the art after having become familiar with the teachings of the present invention.

Regardless of the particular arrangement for moving the specimen 18 between the activation position 56 and the detection position 58 (or for moving the photon source 12 and detector 14), the specimen 18, while in the activation position 56, is positioned adjacent the photon source 12 so that the specimen 18 receives photons 16 therefrom. Then, after having been exposed to the photons 16 for the selected time, the specimen 18 is moved to the detection position 58. While in the detection position 58, the detector 14 detects gamma rays 20 emitted from the specimen 18 as a result of positron/electron annihilations. The times in which the specimen 18 is located in the activation position 56 and in the detection position 58 will vary depending on the particular positron emitter or emitters involved and on the particular material characteristics to be studied. However, the time during which the specimen 18 remains in the activation position 56 should be sufficient to activate a sufficient number of positron emitters so that the gamma rays 20 resulting from positron/electron annihilations will be detectable by the detector 14. Similarly, the specimen 18 should remain in the detection position 58 for a time sufficient to detect gamma rays 20 resulting from annihilation events. Generally speaking, the time that the specimen 18 should remain in the detection position 58 should be at least equal to one half-life of the activated positron emitter or emitters, although the time could be longer or shorter than the half-life. In consideration of these matters, then, the present invention should not be regarded as limited to any particular times for each position.

As was briefly mentioned above, other arrangements are possible for alternately activating the positron emitters then detecting the gamma rays 20 resulting from annihilation events. For example, in another arrangement, the photon source 12 is alternately energized for the activation time period, then de-energized for a detection time period in which gamma rays 20 emitted from the specimen 18 are detected by the detector 14. Again, the activation time period should be set so as to activate a sufficient quantity of positron emitters, whereas the detection time period should encompass at least one

> half-life of the activated positron emitter or emitters."

Again, in making his objections and rejections, the examiner looks only to the drawings and, apparently, only page 8 of the specification. However, those portions of the specification that describe the rapid activation/analysis process 40 in detail make clear that the rapid activation/analysis process 40 is sufficiently described in the specification, particularly when considered in light of the factors listed in MPEP 2164.01(a) identified above. That is, the nature of the invention, the state of the prior art, and the level of one of ordinary skill in the art are such that the description provided in the specification is more than sufficient to all a person having ordinary skill in the art to practice the invention without undue experimentation. To repeat, the state of the prior art in this field is well-developed, as evidenced by the prior art of record in this application. The level of one of ordinary skill in the art is also high, and certainly does not require a detailed, line-by-line recitation of computer code that may be required to perform the rapid activation/analysis process 38 considering that the specification describes in detail the steps that are to be performed by the process 40. Stated another way, while some experimentation might be required to settle upon an optimum arrangement for a particular application, such experimentation is allowable in that it would not be "undue."

The description also makes clear that the rapid activation/analysis process 40 involves both the activation of the positron emitter or emitters as well as the analysis of the raw data 22 collected by the detector 14.

In addition, applicant notes that it is well-established law that the applicant may be his own lexicographer. Applicant coined the terms "normal activation/analysis" to describe the process 38 and "rapid activation/analysis" to describe the process 40. As used in the specification, and as explained

above, these terms are not repugnant to the normal meanings of the terms taken separately, thus are acceptable for use in the patent application.

Remark 2:

The examiner states that the specification fails to state the criteria for determining whether the data collected is sufficient or insufficient.

While it is true that no specific times or quantities are recited in the specification, persons having ordinary skill in the art, after having become familiar with the teachings contained in the specification, could readily ascertain when "sufficient" data have been collected. Indeed, the specification acknowledges this fact in paragraph 0053 which states, in part:

> "The times in which the specimen 18 is located in the activation position 56 and in the detection position 58 **will vary depending on the particular positron emitter or emitters involved and on the particular material characteristics to be studied.** However, the time during which the specimen 18 remains in the activation position 56 should be sufficient to activate a sufficient number of positron emitters so that the gamma rays 20 resulting from the positron/electron annihilations will be detectable by the detector 14. Similarly, the specimen 18 should remain in the detection position 58 for a time sufficient to detect gamma rays 20 resulting from annihilation events. **Generally speaking, the time that the specimen 18 should remain in the detection position 58 should be at least equal to one half-life of the activated positron emitter or emitters, although the time could be longer or shorter than the half-life. In consideration of these matters, then, the present invention should not be regarded as limited to any particular times for each position."** (emphasis added)

Stated simply, the nature of the invention precludes a "one size fits all" approach to this issue, i.e., when "sufficient" data have been collected. This fact is brought-out in the specification and would be known to persons having ordinary skill

in the art. Thus, when read in light of the specification, the term "sufficient," as used in the claims, serves to reasonably describe the subject matter of the invention and to allow its scope to be understood by persons in the field of the invention to a degree sufficient to distinguish the claimed subject matter from the prior art. Accordingly, the term "sufficient," as used in the pending claims, is not indefinite.

Remark 3:

The examiner states that the Doppler broadening algorithm 62, the positron lifetime algorithm 64, the 3-D imaging algorithm 66, and the selective activation algorithm 68 are not sufficiently described. While the examiner correctly states that these processes are presented in Figures 3 and 4 with no description of the internals thereof, the examiner again fails to acknowledge those portions of the detailed description wherein these algorithms are described at length.

For example, the Doppler broadening algorithm 62 is described in paragraphs 0028, 0055, and 0056. The positron lifetime algorithm 64 is described in paragraphs 0028, 0055, and 0057. The 3-D imaging algorithm 66 is described in paragraphs 0028, 0055, 0058, and 0059. Applicant also noted in the specification that the various techniques utilized by these algorithms are well-known in the art and could be easily provided by persons having ordinary skill in the art. In addition, the paper entitled "Positron Annihilation Spectroscopy" which was published in vol. 14 of the Encyclopedia of Applied Physics in 1996 (and cited by the applicant in the Information Disclosure Statement) includes descriptions of these types of algorithms, demonstrating that they are known in the art. It is well-established that the law does not require, and indeed prefers, that an applicant omit from the specification that which is well-known. In re Buchner, supra.

The selective activation algorithm 68 is described in paragraphs 0030 and 0060, of which paragraph 0060 is reproduced

below.

> "For each analysis algorithm, e.g., 62, 64, and 66, described above the data processing system 60 may utilize a selective activation algorithm 68. The selective activation algorithm 68 allows certain isotopes or positron emitters in the specimen 18 to be activated. The selective activation algorithm 68 is responsive to input from the user regarding either the particular positron emitter or emitters to be activated or the desired photon energy. The selective activation algorithm 68 then controls or operates the photon source 12 as necessary to produce photons 16 having energy levels suitable for activating the selected positron emitter or emitters. The selective activation algorithm 68 allows the user to activate certain of the isotopes or positron emitters comprising the specimen 18."

Stated simply, the selective activation algorithm causes the data processing system to set the energy level of the photons produced by the photon source. This allows the user to activate certain of the isotopes or positron emitters in the specimen. It is sufficiently described to allow a person having ordinary skill in the art to practice the invention without undue experimentation. That is, the nature of the invention, the state of the prior art, and the level of one of ordinary skill in the art are such that the description provided in the specification is more than sufficient to all a person having ordinary skill in the art to practice the invention without undue experimentation. Again, applicant notes that the state of the prior art in this field is well-developed, as evidenced by the prior art of record in this application. The level of one of ordinary skill in the art is also high, and certainly does not require a detailed, line-by-line recitation of computer code that may be required to perform the selective activation algorithm 68. Stated another way, while some experimentation might be required to settle upon an optimum arrangement for a particular application, such experimentation is allowable in that it would not be "undue."

Remark 4:

The examiner states that the disclosure is insufficient as to what exactly is meant by the term "lattice characteristic." Applicant elected to use the term "lattice characteristic" to include both lattice defects, as well as the absence of lattice defects, in that a claim which referred to only lattice defects would, presumably, not be infringed if the specimen were to be found defect-free. In addition, the terms "lattice defects" or "characteristics of lattice defects" are used throughout the specification. See for example, paragraph 0028:

> "For example, the Doppler broadening algorithm 62 is useful in assessing the **characteristics of lattice defects** contained in the specimen 18, **such as, for example, damage resulting from mechanical and thermal fatigue, embrittlement, annealing, or manufacturing defects.**" (emphasis added).

Moreover, applicant notes that the term "lattice defect" is basically a dictionary term. The McGraw-Hill Dictionary of Scientific and Technical Terms, Fifth Edition (1994) defines "crystal defect" as follows:

> "Crystal defect: Any departure from crystal symmetry caused by free surfaces, disorder, impurities, vacancies and interstitials, dislocations, lattice vibrations, and grain boundaries. **Also known as a lattice defect.**" (emphasis added).

A copy of page 491 from the McGraw-Hill Dictionary that contains this definition is attached hereto as Appendix A.

Clearly, the term "lattice characteristic," when read in light of the specification, and in light of the well-defined dictionary meaning of the term "lattice defect" has sufficient meaning to a person having ordinary skill in the art, thus is sufficiently defined for the purposes of Section 112, first paragraph.

Conclusion:

As discussed above, the law presumes that the specification complies with the enablement provision of Section 112 unless the patent examiner provides acceptable evidence or reasoning to suggest otherwise. See, for example, In re Marzocchi, supra. Mere conclusionary statements will not suffice. In re Brebner, supra. In attempting to support his objections and rejections, the examiner looked only at certain limited portions of the disclosure (e.g., the drawings only, or only certain pages of the specification) to the exclusion of those written portions of the specification that fully describe the various aspects of the invention. Therefore, the examiner has failed to provide evidence sufficient to establish the required *prima facie* case of insufficient disclosure. Accordingly, under In re Marzocchi, supra, the specification must be regarded as complying with the enablement provision of Section 112. In addition, the foregoing discussion makes clear that the specification is sufficiently enabling as a matter of law.

Re the Section 112, Second Paragraph, Rejections:

The examiner rejected claims 1-3, 5, 7, 8, and 20-36 under 35 U.S.C. §112, second paragraph, as being indefinite for the reasons set forth in section 4 of the office action.

Legal Standard for Rejecting Claims
Under 35 U.S.C. §112, Second Paragraph

The test for definiteness of claim language is whether a person having ordinary skill in the art would understand the bounds of the claim when read in light of the specification, and the degree of precision necessary for adequate claims depends on the nature of the subject matter. Miles Laboratories, Inc., v. Shandon, Inc., 27 USPQ2d 1123 (Fed. Cir. 1993).

Re the Indefiniteness Rejections of Claims 1, 8, 20, 26, 31, 34, and 36:

The examiner rejected claims 1-3, 5, 7, 8, and 20-36 under 35 U.S.C. §112, second paragraph, as being indefinite in that claims 1, 8, 20, 26, 31, 34, and 36 contain the term "lattice characteristic," which the examiner maintains is vague and undefined.

In responding to these rejections, applicant specifically incorporates the points and arguments set forth above for the Section 112, first paragraph, rejections. That is, the term "lattice characteristic" encompasses both lattice defects and the absence of lattice defects, in that a claim which referred to only lattice defects would, presumably, not be infringed if the specimen were to be found defect-free. The terms "lattice defects" or "characteristics of lattice defects" are used throughout the specification and are specifically defined in paragraph 0028:

> "For example, the Doppler broadening algorithm 62 is useful in assessing the characteristics of lattice defects contained in the specimen 18, such as, for example, damage resulting from mechanical and thermal fatigue, embrittlement, annealing, or manufacturing defects."

In addition, the term "lattice defect" has a well-defined meaning in the art, and is even specifically defined in the McGraw-Hill Dictionary of Scientific and Technical Terms, Fifth Edition (1994), p. 491 as follows:

> "Crystal defect: Any departure from crystal symmetry caused by free surfaces, disorder, impurities, vacancies and interstitials, dislocations, lattice vibrations, and grain boundaries. **Also known as a lattice defect.**" (emphasis added).

Clearly, the term "lattice characteristic," which includes both lattice defects and the absence of lattice defects, is sufficiently defined to allow a person having ordinary skill in the art to understand the bounds of the claim, as required by

Miles Laboratories, supra.

Re the Indefiniteness Rejections of Claims 20, 26, 31, 34, and 36:

The examiner asserts that these claims are indefinite in that it is unclear what the Doppler broadening algorithm, positron lifetime, three-dimensional imaging algorithm, and selective activation algorithms encompass.

In responding to these rejections, Applicant specifically incorporates the points and arguments set forth above for the Section 112, first paragraph, rejections. In addition, with regard to the Doppler broadening algorithm, paragraph 0056 of the specification states that several different types of Doppler broadening techniques have been developed and could be used. The specification also states that the Doppler broadening algorithm may comprise the algorithm disclosed in U.S. Patent No. 6,178,218B1.

The positron lifetime algorithm is describe in paragraph 0057 of the specification. That paragraph also makes clear that "systems for detecting positron lifetimes, as well as the algorithms utilized thereby, are well-known in the art and could be easily provided by persons having ordinary skill in the art after having become familiar with the teachings of the present invention."

With respect to three-dimensional imaging algorithms, paragraph 0059 of the specification also states that several different types of 3-D imaging algorithms are known in the art and could be used in conjunction with the present invention.

Clearly, the terms "Doppler broadening algorithm," "positron lifetime algorithm," and "three dimensional imaging algorithm" are specifically referred to in the specification, thus provide sufficient support for their use in the claims. In addition, techniques for performing both of these processes are well-known to persons having ordinary skill in the art, and could be easily provided by persons having ordinary skill in the art after having

become familiar with the teachings of the present invention. For example, the publication cited by the applicant in the Information Disclosure statement, namely the paper entitled "Positron Annihilation Spectroscopy," discusses the Doppler broadening, positron lifetime, and 3-D imaging techniques, as well as methods for performing these techniques.

Therefore, because Doppler broadening, positron lifetime, and 3-D imaging techniques are well known to persons having ordinary skill in the art and could be easily provided by persons having ordinary skill in the art after having become familiar with the teachings of the present invention, the references in the specification and claims to "Doppler broadening algorithm," "positron lifetime algorithm," and "three dimensional imaging algorithm" meet the requirements set forth in Miles Laboratories, supra, that is, these terms have sufficient meaning to persons having ordinary skill in the art to allow them to understand the bounds of the claims when read in light of the specification.

With regard to the selective activation algorithm, applicant notes that the selective activation algorithm is described in paragraph 0060 and basically involves controlling or operating the photon source as necessary to produce photons having energy levels suitable for activating the selected positron emitter or emitters. As described in paragraph 0036, electron accelerators capable of producing photons having a range of energies are well-known in the art. Therefore, a person having ordinary skill in the art could develop a suitable selective activation algorithm based on his level of skill coupled with an understanding of the teachings of the present invention. The fact that some experimentation might be required, or may even be complex, does not make it undue. See, for example, In re Wands, supra.

With regard to the examiner's argument that the terms "normal activation/analysis" and "rapid activation/analysis" as used in the claims are indefinite, applicant repeats the arguments set forth above, in that these terms are described in the specification to a degree sufficient to allow a person having

ordinary skill in the art to readily understand the bounds of the claims.

Legal Standard For Rejecting Claims Under 35 U.S.C. §102(b) and §103

The standard for lack of novelty, that is, for "anticipation," under 35 U.S.C. §102 is one of strict identity. To anticipate a claim for a patent, a single prior source must contain all its essential elements. Hybritech, Inc. v. Monoclonal Antibodies, Inc., 231 USPQ 81, 90 (Fed. Cir. 1986). Invalidity for anticipation requires that all of the elements and limitations of the claims be found within a single prior art reference. Scripps Clinic & Research Foundation v. Genentech, Inc., 18 USPQ2d 1001 (Fed. Cir. 1991). Furthermore, functional language, preambles, and language in "whereby," "thereby," and "adapted to" clauses cannot be disregarded. Pac-Tec, Inc. v. Amerace Corp., 14 USPQ2d 1871 (Fed. Cir. 1990).

The test for obviousness under 35 U.S.C. § 103 is whether the claimed invention would have been obvious to those skilled in the art in light of the knowledge made available by the reference or references. In re Donovan, 184 USPQ 414, 420, n. 3 (CCPA 1975). It requires consideration of the entirety of the disclosures of the references. In re Rinehart, 189 USPQ 143, 146 (CCPA 1976). All limitations of the claims must be considered. In re Boe, 184 USPQ 38, 40 (CCPA 1974). In making a determination as to obviousness, the references must be read without benefit of applicants' teachings. In re Meng, 181 USPQ 94, 97 (CCPA 1974). In addition, the propriety of a Section 103 rejection is to be determined by whether the reference teachings appear to be sufficient for one of ordinary skill in the relevant art having the references before him to make the proposed substitution, combination, or other modifications. In re Lintner, 173 USPQ 560, 562 (CCPA 1972).

A basic mandate inherent in Section 103 is that a piecemeal reconstruction of prior art patents shall not be the basis for

a holding of obviousness. It is impermissible within the framework of Section 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art. In re Kamm, 172 USPQ 298, 301-302 (CCPA 1972). Put somewhat differently, the fact that the inventions of the references and of the applicants may be directed to concepts for solving the same problem does not serve as a basis for arbitrarily choosing elements from references to attempt to fashion applicants' claimed invention. In re Donovan, 184 USPQ 414, 420 (CCPA 1975).

In the case of In re Wright, 6 USPQ2d 1959 (Fed. Cir. 1988) (restricted on other grounds by In re Dillon, 16 USPQ2d 1897 (Fed. Cir. 1990), the CAFC decided that the Patent Office had improperly combined references which did not suggest the properties and results of the applicants' invention nor suggest the claimed combination as a solution to the problem which applicants' invention solved. The CAFC reached this conclusion after an analysis of the prior case law, at p. 1961:

> "We repeat the mandate of 35 U.S.C. §103: it is the invention as a whole that must be considered in obviousness determinations. The invention as a whole embraces the structure, its properties, and the problem it solves. See, e.g., Cable Electric Products, Inc. v. Genmark, Inc., 770 F.2d 1015, 1025, 226 USPQ 881, 886 (Fed. Cir. 1985) ("In evaluating obviousness, the hypothetical person of ordinary skill in the pertinent art is presumed to have the 'ability to select and utilize knowledge from other arts reasonably pertinent to [the] particular problem' to which the invention is directed"), quoting In re Angle, 444 F.2d 1168, 1171-72, 170 USPQ 285, 287-88 (CCPA 1971); In re Antonie, 559 F.2d 618, 619, 195 USPQ 6, 8 (CCPA 1977) ("In delineating the invention as a whole, we look not only at the claim in question... but also to those properties of the subject matter which are inherent in the subject matter and are disclosed in the Specification") (emphasis in original).

The determination of whether a novel structure is or is not "obvious" requires cognizance of the properties of that structure and the problem which it solves, viewed in light of the teachings of the prior art. See, e.g., In re Rinehart, 531 F.2d 1048, 1054, 189 USPQ 143, 149 (CCPA 1976) (the particular problem facing the inventor must be considered in determining obviousness); see also Lindemann Maschinenfabrik GmbH v. American Hoist and Derrick Co., 730 F.2d 1452, 1462, 221 USPQ 481, 488 (Fed. Cir. 1984) (it is error to focus "solely on the product created, rather than on the obviousness or notoriousness of its creation") (quoting General Motors Corp. v. U.S. Int'l Trade Comm'n, 687 F.2d 476, 483, 215 USPQ 484, 489 (CCPA 1982), cert. denied, 459 U.S. 1105 (1983).

Thus the question is whether what the inventor did would have been obvious to one of ordinary skill in the art attempting to solve the problem upon which the inventor was working. Rinehart, 531 F.2d at 1054, 189 USPQ at 149; see also In re Benno, 768 F.2d 1340, 1345, 226 USPQ 683, 687 (Fed. Cir. 1985) ("appellant's problem" and the prior art present different problems requiring different solutions")."

A reference which teaches away from the applicants' invention may not properly be used in framing a 35 U.S.C. §103 rejection of applicants' claims. See United States v. Adams, 148 USPQ 429 (1966).

Re the Anticipation Rejections of Claims 1-3, 7, and 8:

The examiner rejected claims 1-3, 7, and 8 under Section 102(b) as being anticipated by Pongratz for the reasons set forth in the office action. These rejections are improper in that Pongratz fails to disclose non-destructive testing apparatus having a data processing system that produces "output data indicative of a lattice characteristic of the specimen being tested." Because Pongratz fails to disclose this limitation, Pongratz cannot anticipate claims 1-3, 7, and 8 as a matter of law.

Pongratz discloses a device for detecting nitrogenous, phosphoric, chloric and/or oxygenous substances in an object

(e.g., explosives or addictive substances) wherein gamma radiation from the annihilation event are used to determine whether a certain element, such as nitrogen, phosphorous, chlorine, and/or oxygen is present in the sample being tested. Pongratz does not teach that the gamma radiation from the annihilation event could be used to provide information regarding a lattice characteristic (i.e., the presence or absence of a lattice defect) of the specimen being tested. That is, merely determining whether certain elements are present does not meet the requirement of determining a "lattice characteristic" as that term is used in the present invention. Accordingly, amended claim 1 is not anticipated by Pongratz. Dependent claims 2, 3, and 7 are likewise not anticipated by Pongratz at least because these dependent claims depend from claim 1, which is allowable over Pongratz.

Claim 8 requires "data processing means for producing output data indicative of a lattice characteristic of the specimen." Again, this limitation is not met by Pongratz, which utilizes the gamma rays produced by annihilation events to determine whether certain elements are present in the specimen. Consequently, claim 8 is not anticipated by Pongratz.

In an effort to support his rejections, the examiner attempts to characterize the pending claims as merely claiming an intended use. This argument confuses the effect or result of an invention with the use of an invention.

The currently-pending claims, which require the data processing system to produce output data indicative of a lattice characteristic of the specimen being tested, must be regarded as reciting a structural requirement in that the data processing system is configured or programmed to produce such output data in accordance with the teachings provided in the specification. If such limitations are not "structural" and merely represent an intended use, then it would be possible to simply take the Pongratz device, for example, and use it to perform non-destructive testing and to produce output data indicative of a

lattice characteristic. Of course, the Pongratz device cannot do this, as it is only capable of producing output data indicative of whether a certain element, such as nitrogen, phosphorous, chlorine, and/or oxygen is present in the sample being tested. As explained above, such data are not indicative of a "lattice characteristic" as that term is used in the present invention.

Stated another way, in order to have the Pongratz device meet the limitations of independent claims 1 and 8, Pongratz would have to be somehow **modified** so that it produced "output data indicative of a lattice characteristic." Of course, if a prior art device has to be modified or changed in order to meet a claim limitation, it cannot anticipate that claim under Section 102.

Re the Anticipation Rejections of Claims 1-3, and 8:

The examiner rejected claims 1-3, and 8 under Section 102(b) as being anticipated by Miller. These rejections are also improper in that Miller fails to disclose non-destructive testing apparatus having a data processing system that produces "output data indicative of a lattice characteristic of the specimen being tested." Because Miller fails to disclose this limitation, Miller cannot anticipate claims 1-3, and 8.

Miller teaches a device for detecting the presence in an object of explosive materials, such as nitrogen. Miller does this in a manner similar to that disclosed by Pongratz in that gamma radiation from the annihilation event are used to determine whether a certain element, such as nitrogen, is present in the object being tested. Nowhere does Miller disclose that the gamma radiation from the annihilation event could be used to determine information that is indicative of a lattice characteristic of the specimen. Because Miller fails to meet this limitation, Miller cannot anticipate claim 1. Dependent claims 2 and 3 are also allowable in that they embody, by virtue of their dependencies from claim 1, the same limitations that are not met by Miller.

Claim 8 is also not anticipated by Miller in that Miller fails to disclose data processing means for producing output data indicative of a lattice characteristic of the specimen. This limitation is not met by Miller, which utilizes the gamma rays produced by annihilation events to determine whether nitrogen is present in the object. Consequently, claim 8 is not anticipated by Miller.

The examiner attempts to have Miller meet the limitations of claims 1-3 and 8 by arguing that Miller's identification of a certain element, such as nitrogen, as well as its concentration, is the same as a "lattice characteristic." This is erroneous. As discussed above, the term lattice characteristic, as used in the present invention to indicate either a lattice defect or the absence of a lattice defect, does not encompass the mere identification, or even concentration, of a particular element in the specimen being tested. Because it does not so encompass the mere identification or concentration of an element in the specimen, Miller cannot anticipate any of claims 1-3 and 8.

<u>Re the Obviousness Rejection of Claim 5</u>:

The examiner rejected claim 5 as being obvious over Miller in view of Alex. These rejections are improper in that there is no suggestion or incentive in either Miller or Alex to make the combination urged by the examiner.

As discussed above, Miller fails to disclose a non-destructive testing apparatus having data processing system that produces "output data indicative of a lattice characteristic of the specimen being tested." While Alex does teach the use of a germanium detector to measure hydrogen embrittlement, neither reference provides the suggestion or incentive required to combine them in the manner urged by the examiner.

The test for obviousness is not whether the various elements of the claim can be found in the prior art, but whether the prior art provides some suggestion, incentive, or motivation to a

person having ordinary skill in the art to combine those elements make the claimed combination. As the Court of Appeals for the Federal Circuit has stated:

> "If identification of each claimed element in the prior art were sufficient to negate patentability, very few patents would ever issue. Furthermore, in rejecting patents solely by finding prior art corollaries for the claimed elements would permit an examiner to use the claimed invention itself as a blueprint for piecing together elements in the prior art to defeat the patentability of the claimed invention. Such an approach would be an "illogical and inappropriate process by which to determine patentability" [citation omitted]" In re Rouffet, 47 USPQ2d 1453, 1457 (Fed. Cir. 1998).

Because neither Miller nor Alex provide the required suggestion or incentive to modify either device by picking and choosing certain elements from the other in order to come-up with the claimed combination, the examiner has failed to establish the required *prima-facie* case of obviousness of claim 5. Claim 5 is, therefore, allowable.

Re the Rejections of Claims 20, 21, 23, 24, 26-28, and 31-36:

The examiner rejected the foregoing claims as being obvious over either one of Pongratz or Miller "in view of applicant's own admission of prior art," as set forth in section 8 of the office action. These rejections are improper in that they use the applicant's own disclosure as a guide for assembling the prior art. ?

prior art is prior art regardless of info source

As discussed above, both Pongratz and Miller disclose similar systems for detecting whether certain elements (e.g., nitrogen) are present in an object. Neither reference teaches or suggests anything about using or modifying their respective devices to allow them to produce output data indicative of a lattice characteristic of the object being tested. While the specification describes that certain analysis algorithms are known in the art, what the examiner has done in supporting his

rejections is to use applicant's own teachings as a blueprint for assembling elements from the prior art. It is well-established that such hindsight reconstruction is impermissible and cannot form the basis for an obviousness rejection under Section 103. The invention must be viewed not after the blueprint has been drawn by the inventor, but as it would have been perceived in the state of the art that existed at the time the invention was made. Because the examiner has failed to point to any prior art (not the applicant's own teachings) that would provide the suggestion or incentive to combine the prior art, the examiner has failed to establish the required prima-facie case of obviousness of claims 20, 21, 23, 24, 26-28, and 31-36. Therefore, amended claims 20, 21, 23, 24, 26-28, and 31-36 are allowable as a matter of law.

Applicant believes that all of the claims now pending in this patent application, as amended and described above, are allowable and that all other issues raised by the examiner have been addressed. Therefore, applicant respectfully requests the examiner to reconsider his rejections and to grant an early allowance. If any questions or issues remain to be resolved, the examiner is requested to contact the applicant's attorney at the telephone number listed below.

Respectfully submitted,

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Date: 4-21-03

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:	)	
	)	
AKERS, Douglas, W.	)	
	)	Examiner: Palabrica, R.J.
Serial No. 09/932,531	)	
	)	Group Art Unit: 3641
Filing Date: August 17, 2001	)	
	)	Conf. No.: 4276
For: METHOD AND APPARATUS FOR PHOTON ACTIVATION POSITRON ANNIHILATION ANALYSIS	)	

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Title:

The Title of the invention is amended as follows:

[METHOD AND] APPARATUS FOR PHOTON ACTIVATION POSITRON ANNIHILATION ANALYSIS

In the Abstract:

The Abstract on page 38 is amended as follows:

Non-destructive testing apparatus according to one embodiment of the invention comprises a photon source. The photon source produces photons having predetermined energies and directs the photons toward a specimen being tested. The photons from the photon source result in the creation of positrons within the specimen being tested. A detector positioned adjacent the specimen being tested detects gamma rays produced by annihilation of positrons with electrons [which are indicative of a material characteristic of the specimen being tested]. <u>A data processing system operatively associated with the detector produces output data indicative of a lattice characteristic of the specimen being tested.</u>

In the Specification:

Paragraph 0010 on page 5 is amended as follows:

[0010] Non-destructive testing apparatus according to one embodiment of the invention comprises a photon source. The photon source produces photons having predetermined energies and directs the photons toward a specimen being tested. The photons from the photon source result in the creation of positrons within the specimen being tested. A detector positioned adjacent the specimen being tested detects gamma rays produced by annihilation of positrons with electrons [which are indicative of a material characteristic of the specimen being tested]. <u>A data processing system operatively associated with the detector produces output data indicative of a lattice characteristic of the specimen being tested.</u>

<u>In the Claims</u>:

Claim 20 is amended as follows:

20. (Amended) Non-destructive testing apparatus, comprising:

a photon source, said photon source producing photons having a predetermined energy and directing the photons toward a specimen being tested, the photons from said photon source resulting in the creation of positrons within the specimen being tested;

a detector positioned adjacent the specimen being tested, said detector producing raw data indicative of a positron annihilation event; and

a data processing system operatively associated with said detector <u>and said photon source, said data processing system operating in accordance with a normal activation/analysis process when a half-life of a selected positron emitter within the specimen being tested is greater than a predetermined half-life, said data processing system operating in accordance with a rapid activation/analysis process when a half-life of the selected positron emitter within the specimen being tested is less than the predetermined half-life, said data</u>

processing system, when operating in accordance with the rapid activation/analysis process, alternatively activating said photon source and detecting raw data indicative of a positron annihilation event, said data processing system including a Doppler broadening algorithm, said Doppler broadening algorithm processing raw data indicative of a positron annihilation event to produce output data indicative of a lattice characteristic of the specimen being tested.

Claim 26 is amended as follows:

26. (Amended) Non-destructive testing apparatus, comprising:

positron activation means for activating a positron emitter within a specimen being tested;

detector means for detecting a positron annihilation event within the specimen being tested and for producing raw data indicative of the positron annihilation event;

means for alternately activating the positron emitter within the specimen being tested and detecting a positron annihilation event; and

data processing means operatively associated with said detector means, said data processing means processing raw data indicative of the positron annihilation event in accordance with a Doppler broadening algorithm to produce output data indicative of a lattice characteristic of the specimen being tested.